Wednesday, October 2, 2013

Description

What is the X62T-MIT?

The X62T-MIT is electronically identical to the X62T-HART but with modified software that emulates an Enraf 862 MIT. The X62T-MIT can be connected to Enraf servo gauges 854 ATG, 854 XTG, 873 radar gauge or 877 hydrostatic gauge that are fitted with appropriate option boards (see below).

The enclosure entry openings of the X62T-MIT have been modified to enable easy replacement of Enraf MIT units. This means (in deviation from the X62T Installation Guide PN 500013) that both entries are now PG16:
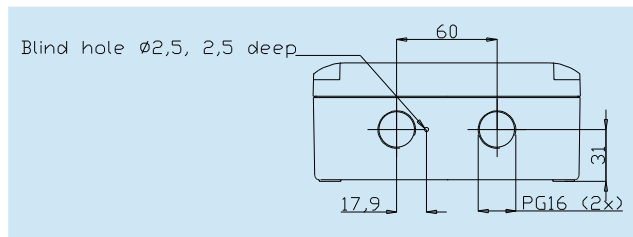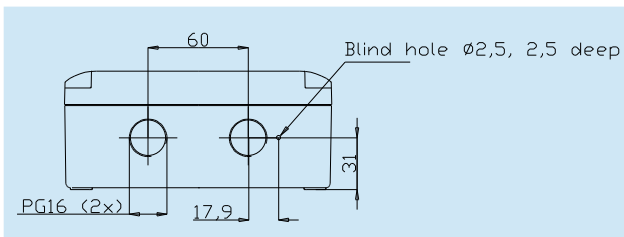
- The cable entry is PG16 to allow an existing PG cable gland or adapter to be used when retrofitting.
- The MTT entry is also PG16 with positioning hole compatible to the original Enraf MTT G1/2-G1/2 adapter.

2 versions of the X62T-MIT exist: X62T-MIT/H (head mounted) and X62T-MIT/W (wall mounted):

/H   This is the default enclosure. Compared to the 862 MIT the MIT and cable entries are mirrored. This should not be a problem in most head mounted installations. The advantage is that internally MTT and host connection wires do not cross which eases wiring during installation.
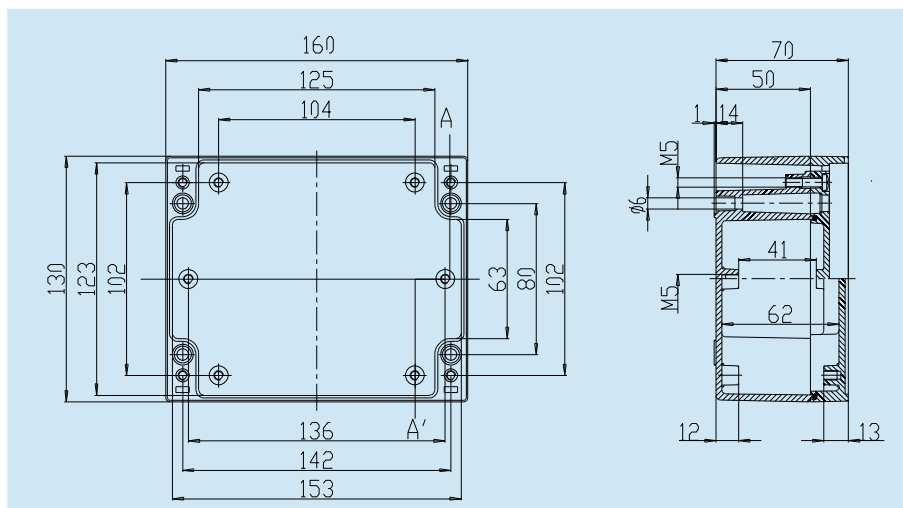
/W   In certain wall mounted installations with rigid conduits it is difficult to mirror the external connections. In this case we recommend the /W enclosure option in which the position of the entries is identical to the original 862 MIT. Internally the MIT wires will cross the host connection wires.
As the MIT wires and host wires are 2 different Intrinsically Safe circuits they MUST be kept isolated with a total of > 0.5mm solid isolation or > 2mm clearance. Add additional isolation sleeve or tape if needed to increase solid isolation or use tie wraps to maintain clearance.

X62T-MIT/H   **X62T-MIT/W**

Mounting holes

In all cases follow local regulations and IEC60079-14 or other local code.

Verification before installation

Verify if the X62T-MIT is compatible to Enraf gauge option boards

At this time the X62T-MIT can only be connected to MPU, HPU, OPU option boards that support MTT.

Note that each option board also exists in a MIR version that supports MRT. These option boards are currently only supported by the X62T-MIR.

If unsure about which option board is installed in your Enraf gauge and a PET (Portable Enraf Terminal) is available the following procedure can be used:
- Make sure the attached tank thermometer is of the MTT type with 16 elements.
- Make sure the MTT is functioning correctly. This can be verified by issuing command EM, which should return EM=xx00. If errors are returned it may be possible to verify the errors are caused by the 862 MIT by temporarily replacing the unit by a Known Good 862 MIT (for instance from another tank).
- Make sure the gauge is certified as Ex d [ia] or Ex ed [ia] by examining the type plate and the documentation.
- Issue command software version: SV. This will return the installed option boards. At least an MPU, HPU or OPU option board needs to be present, example MPUA3.0
- Issue command number of temperature elements: MN, this will return the number of temperature elements, example MN=16.

Note: If the MTT or MPU/HPU/OPU option board are malfunctioning while the 862 MIT works correctly, this problem can not be resolved by replacing the 862 MIT by a X62T-MIT. In fact it will be more difficult to diagnose problems when a X62T-MIT is connected.

Verify if the X62T-MIT is compatible to the MTT

Software revision X62-MIT-V001 (up to and including SN X62T-2012-0005)

The X62T-MIT supports the same MTT probes as does the Enraf 862 MIT. If you are also replacing the 862 MTT probe with a VITO MTT probe make sure the probe has 16 spots and the reference element is at the bottom. Please contact a Honeywell-Enraf representative for more information. You can identify a compatible probe in the following way:
- Identification code on the type plate: □□□N764B□□□0□□□0
- Wiring: 2 x RED, 2 x BROWN, 1 x YELLOW, 14 x BLUE

Note: If the MTT has an Orange wire (certain VITO types) it is not compatible with 862 MIT or X62T-MIT with X62T-MIT-V001 firmware as this indicates the Pt100 reference element is not at the bottom of the probe. If your probes have an orange wire please contact your Exalon Delft distributor or goto http://www.exalondelft.nl/en/contact.shtml to contact us directly.

Software revision X62-MIT-V002 (SN X62T-2012-0006 and higher)

The X62T-MIT supports the same 854 MTT probes as does the Enraf 862 MIT as well as 764 [A..D] VITO MTT probes. Make sure the probe has 16 spots (VITO LT probes are not supported). Please contact a Honeywell-Enraf representative for more information. You can identify a compatible probe in the following way:
- Identification code on the type plate: □□□N764X□□□0□□□0 with X in [A...D]
- *Wiring: 2 x RED, 2 x BROWN, 1 x YELLOW, 14 x BLUE or 2 x RED, 2 x BROWN, 1 x YELLOW, 1 x ORANGE, 13 x BLUE*

Information: An ORANGE wire indicates the Pt100 reference element is NOT in the position of the lowest spot. This is the case for most newer 764 MTT probes. Positioning the Pt100 1m above the tank bottom increases accuracy as the temperature difference between the Pt100 and thermocouple spots is reduced. To be able to measure the temperature near the bottom of the tank one thermocouple is then placed at the lowest position and wired with an ORANGE wire.

Installation

Powering the X62T-MIT
The X62 can draw a constant current of either 4 mA or 16 mA. When programmed with X62-MIT software high current mode must be selected (switch 1 in ON position).

The X62-MIT requires a voltage between 12V and 24V on the terminals CN1. When connected to an Enraf MPU or HPU option board the supplied power will be sufficient.

Note: Remember that issuing a reset command to the gauge (RS) will temporarily cut power to the X62.

Steps to Setup the X62T-MIT for use with an MTT
- Connect the MTT probe according the connection drawing below. FIRST connect one BROWN wire to terminal CN-3 to prevent ESD (electrostatic discharges) to the sensitive inputs. Connect blue wires to the terminals with blue color in the drawing, yellow to the yellow terminal, etc.
- Set switch 1 in On position to enable high current mode.
- Set switch 2 in Off position if there is NO ORANGE wire, ON if there IS an ORANGE wire.
- Set switch 3 in Off position to have the X62 start in Run Mode.
- Enable order detection of the thermocouples by setting switch 4 in On position.
- Turn power of X62T on. Wait for 2 minutes minimum to perform the order detection.
- Turn power of X62T off and set switch 4 in off position. All other switches need to be left in their current positions.

Order Detection of Thermocouples
The Blue thermocouples of the MTT can be connected in any order. The X62T can be configured to determine the connection order during power-up. This can take up to 2 minutes.

After detection it stores the detected order in internal persistent storage (EEPROM) and uses this for operation. Once the correct connection order has been determined and stored startup time can be greatly reduced by turning off Config Mode.

During order detection the actual temperature values are not available to the gauge. At this time the X62 will output 0ºC for all temperature spots. Also, during this time the value for the internal test resistor of the X62 is intentionally set to an incorrect value to signal to the gauge that the measured temperatures are not valid. An Enraf MPU or HPU will store this value in item MU. The correct value is 166.50Ω. During any error condition in the X62 as well as during start-up and order detection this value will be set to 150.00Ω.

Note: we recommend turning off Config Mode after commissioning has been completed and correct temperature measurement has been verified.

To make the X62T re-determine the order set switch 4 (Config Mode) in position 'On' and turn the gauge power off or issue an RS command on the gauge.
After connecting or reconnecting MTT wires the order of the Blue wires will most likely be changed and the correct thermocouple order must be re-detected.

Note: always re-detect the order of the thermocouples after rewiring the thermocouple wires. An incorrect or outdated connection order stored in the X62 will most likely be detected as an error condition. In this case an Enraf gauge will show 0.0ºC on all temperature sports and the value of item MU will be 150.00Ω.

Setting the MTT order in the Enraf gauge
As the X62 internally determines the correct order of the Thermocouple elements, the spot temperature are always output in the correct order to the MPU or HPU option board. It is therefore not needed to have the MPU or HPU determine the order.
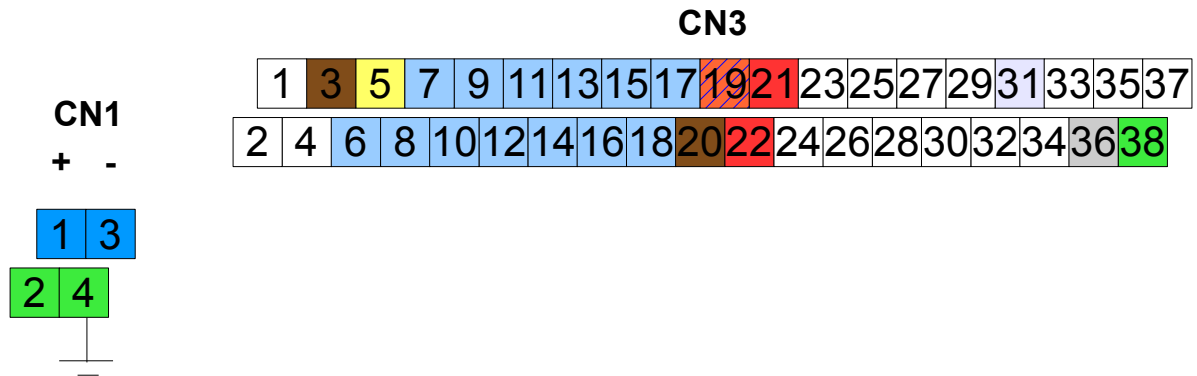
Instead a fixed order must be configured using the following item command:
MW=0123456789ABCDEF

Switches on the X62T-MIT

Switch	Color	Function
1	BROWN	Current Mode. ON for High (16 mA), OFF for Low (4 mA) constant current.
2	RED	MTT Type Off – NO ORANGE wire present, connect the additional BLUE wire to CN3-19 On – ORANGE wire IS present, connect the ORANGE wire to CN3-19
3	ORANGE	Program mode. 1 or ON for Programming Mode, 0 or OFF for Run Mode. (the device should always be in Run mode, except during software updates)
4	YELLOW	Config Mode. 1 or On for Config Mode, 0 or Off for No Config Mode (Config Mode enables thermocouple order detection. This must be performed at least once after rewiring the MTT to the X62T-MIT)

MTT Connections

MTT Connection

CN3

1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38

CN1

+ -

1	3
2	4

Error Codes

The X62T-MIT firmware measures all MTT Pt100 and thermocouple elements independently from the MPU/HPU option board. Errors are detected when calculating the resistance and voltages from the individual sub-measurements and before communicating the end result to the MPU/HPU. For diagnostic purposes the X62T-MIT provides the following mechanism:

- An X62 hardware failure is shown in the value of the measured internal test resistor. The value is transmitted to the gauge to item MU.
- An error in the MTT element measurement is indicated by making the measured resistance or voltage either below the minimum or above the maximum. Both values generate temperature out of range errors on the gauge. The actual thermocouple voltage value can be retrieved by issuing item VP=00.nn (n = 01 … 15), followed by item VV, the actual Pt100 resistance by issuing item VP=02.03, followed by item VV.

Note: This is slightly different from the 862 MIT which communicates each sub-measurement to the MPU/HPU allowing the MPU/HPU to do the calculation and detect errors.

The following table lists the error situations and the values being reported.

Table 1: MIT Normal and Error Values

Error Situation	MU Value	VP Value
X62 VCC Test Failed	1	0
X62 VEE Test Failed	2	0
X62 VBASE Test Failed	4	0
MTT SDev Error	8	0
MTT SDev Too Large	16	0
MTT Wiring Error	20+CN3 terminal number where error is located	0
MTT Order Detection Error	50+CN3 terminal number where error is located	0
Data Not Ready (*after startup*)	150	0
PT100 not connected	166.5	PT100 Max All TC Min
PT100 Impossible To Compute	166.5	PT100 Max All TC Min
PT100 Measurement Failed	150	PT100 Max All TC Min
TC spot Not Connected	166.5	Max
TC spot Impossible To Compute	166.5	Max
TC spot Measurement Failed	150	Max
Spot Measurement Invalid High	166.5	Max
Spot Measurement Invalid Low	166.5	Min
No Error	166.5	Measured Value

Note: PT100: Min equals 0Ω, Max equals 800Ω. Thermocouple: Min equals -6000µV, Max equals 20000µV. These values are selected to have the gauge show out of range error flags.